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earn. It is reported that recently, when he claimed that the station at Woods Holl was the greatest biological station in the world because it hatched the largest number of fry, he was reminded of the Naples station, but replied that he had not heard of it.

The station at Woods Holl, made by Baird, Goode and MacDonald a center of research, fruitful in practical applications, regarded as a model by other nations, has now fallen into disrepute. The institution has been practically closed to investigators. The present Commissioner is apparently unable to appreciate what such a station means and what great practical benefit might proceed from it. Scientific research and the applications of science are but the obverse and reverse of the same coin, and he who expects to do without one side of the coin will find that he has none left in his pocket.

Now since the Coast and Geodetic Survey has been reformed by the present administration, only the Fish Commission needs its attention. When Mr. Cleveland was Governor of New York he vetoed the bill for the continuation of the Geological Survey of the State, and when President he occasionally showed that he had too long postponed his university training. The present administration is, however, in full sympathy with the scientific departments of the government, and is competent to decide whether the present Commissioner meets the requirements of the law, and, if not, to appoint a Commissioner of 'proved scientific and practical knowledge of the fishes of the coast.'

THE NATIONAL ACADEMY OF SCIENCES.

THE autumn meeting of the National Academy was held this year in Boston, beginning at 11 a. m. on Tuesday, November 16th, and continuing until Thursday afternoon. The attendance of members was unusually large for an autumn meeting, about thirty being present at one time or another during the three-day session. The absence of some members residing almost within sight of the place of meeting was a noteworthy indication of a lack of great interest in the leading scientific organization of the country. The program of papers offered was also unusually long and varied, nearly every department of science being represented. While all of these contributions were valuable and taken together represented a large amount of original investigation, none could be considered as unusually or unexpectedly important or strikingly novel in character or results.

The session opened with Professor Woodward's paper on 'The Mass of the Earth's Atmosphere.' The general conclusions of interest were that the radius of the atmosphere was probably five or six times that of the earth, and that while its mass could not exceed five per cent. of that of the earth it was probably not more than one millionth as much. Professor Carl Barus presented the result of further studies of the effect of time on the temper of steel, the beginnings of which he had published some years ago. The lapse of years has served to bring out more clearly the interesting and important secular changes, the recent measurements having been made on the same specimens used in the earlier stages of the investigation.

This paper was followed by that of Dr. Mendenhall on 'Steel Knife Edges,' which was also a continuation of researches communicated to the Academy at previous meetings. The present investigation

consisted in the main of an examination of the behavior of steel knife edges under pressure and with varying angles. By observing the electrical resistance of the surface of contact of the pressure plate and the knife edge, the effect of pressures varying from zero to twenty thousand pounds was determined, the length of edge being about two inches. The superiority of the wide angle edges was clearly shown, confirming the conclusion reached in previous investigations. Professor O. C. Marsh next gave an interesting account of recent visits to the Russian museums, in which, greatly to his surprise, he found no examples of dinosaurs. He held, however, that they would yet be found in the district represented by these museums.

Professor Chittenden presented the results of an elaborate investigation of the effects of borac and boric acid on nutrition, and Dr. Minot, who was formally introduced as a new member by the President of the Academy, having been elected to membership at the April meeting in Washington, read an interesting account of embryological investigations in which he has been engaged. Professor W. A. Rogers gave the results of his last determination of the relation of the yard and meter, depending upon a recent comparison of his own standard with one of the new prototypes in the Office of Weights and Measures at Washington. Professor Morse presented important results of the study of the ancient molluscan fauna of New England and Professor Verrill discussed cannibalistic selection as a factor in evolution.

The session on Wednesday morning was devoted to the transaction of business, members only being admitted. The important event of the session was the formal acceptance, by the Academy, of the gift of \$20,000 from Miss Alice L. Gould, daughter of the late Dr. B. A. Gould, one of the charter members of the Academy. Miss

Gould had communicated her intention of making this gift in honor of the memory of her father and of his long connection with and interest in the National Academy, at the April meeting in Washington, but on Wednesday the deed of gift was formally presented, together with the conditions on which it was made and the names of the first trustees. Its acceptance was authorized by the Academy and the trust assumed. The income of the fund is to be devoted to the encouragement of astronomical research and its management is to be essentially like that of the Bache fund. The trustees selected by Miss Gould were Professor Boss, Dr. S. C. Chandler and Professor Asaph Hall.

In the scientific session that followed, Professor Hyatt reported progress in an interesting study in which he is engaged, upon the migration of land shells on the Hawaiian Islands. The material for this study had been obtained from an extensive collection of shells made by Rev. J. T. Gurlick while a missionary in the islands thirty or forty years ago. This collection had been so systematically made and the locations so carefully noted that Professor Hyatt was enabled to lay out on a relief model the various localities occupied by different species, and to indicate the paths along which their migrations must almost certainly have been directed.

This paper was followed by an exhibition by Professor Michelson of his new harmonic analyzer, which he had brought from Chicago to show to the Academy. In the latest form of the machine eighty elements were included, and it appeared to be capable of producing results correct to within about one per cent. The machine was put in operation, and its work, both in analysis and synthesis, was greatly admired. Mr. C. L. Norton presented by invitation a description of new apparatus, one for thermometer comparisons and the other for determining the heat of combustion.

A paper by Dr. Weir Mitchell and Alonzo H. Stewart, on the 'Action of Venom of *Crotalus Adamanteus* Upon the Blood,' was read by Dr. Bowditch.

On Thursday there were further contributions by Professors Verrill and Marsh. Professor Cross, on invitation of the Council, presented a paper on the 'Wave Siren,' and S. C. Chandler discussed the agreement of 'The Theory of the Motion of the Pole with Recent Observations.' There was also a paper by Major Powell, 'An Hypothesis to Account for Movements in the Crust of the Earth,' and Professor Emmons gave an account of the International Congress of Geologists at St. Petersburg.

As might well be expected, the social features of a meeting of the Academy were not lacking. A number of academicians availed themselves of the opportunity to hear the last of the course of lectures on 'Tides' by Professor George Darwin, at the Lowell Institute, the final lecture of the course being on Tuesday evening. There was unusual interest in the reception on that evening, at the home of Mrs. Professor W. B. Rogers, whose husband was for several years and at the time of his death the President of the Academy. Similar courtesies were extended to members on Wednesday and Thursday afternoons, and on Wednesday evening Professor Trowbridge described and exhibited his new 10,000-cell storage battery and high-voltage apparatus.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

THE 18th annual and 36th regular meeting of the American Society of Mechanical Engineers was held in New York, beginning on November 30th. This Society, now seventeen years old, numbers nearly two thousand members, including substantially all mechanical engineers of the United States. Its transactions are always rich in valuable

technical facts and data and are usually so extensive as to fill a large annual volume.

The principal papers of the present session were the following:

Mr. F. W. Dean summarizes the progress of improvement in reducing the 'Cost of Steam Power' from 1870 to 1897; showing that the gain has been between thirty and forty per cent. He attributes this saving to the following: 37% to higher steam-pressure and ratios of expansion, multiple-cylinder engines, steam jacketing and drying or superheating the steam; 5% to the use of vertical engines; 7% to improved boilers; 7% to economizers heating the feed water; 2% to improved grates. The weight of steam used per horse-power per hour has fallen from 20 to 12.5 pounds, as minima for the dates given. He finds the compound engine the usual and on the whole most successful form of engine and gives valuable data relating to its efficiency and the costs of power where it is employed.

Professor Carpenter presents the results of 'Tests of Centrifugal Pumps' and 'Calibration of a Weir' at Chicago, where the unique opportunity was presented of making such determinations on an exceptionally large scale, and of checking the standard formulas for discharge perhaps more accurately than ever before on anything approaching so large a scale. The conclusion is reached that the Weisbach formula is more exact than the Francis, under such circumstances, and that it is best employed without allowing for 'end-contraction.' The great centrifugal pumps, of usual form, gave efficiencies rising to above 60 per cent.

Dr. Thurston, in conjunction with Mr. Brinsmade, read a paper on 'Multiple Cylinder Engines and Effects of Variation of Loads,' in which the experimental investigation of the relative efficiencies at various loads was determined for the standard 'compound' and 'triple expan-